PREDICTION OF BODY WEIGHT OF TWO STRAINS OF LAYERPULLETS USING MORPHOMETRIC TRAITS

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ABSTRACT
A total of 200-day old layer chicks comprising of 100 chicks each of Nera Black and Lohmann Brown Classic were used to determine prediction models for body weight from morphometric parameters. Data were collected on body weight and morphometric trait; breast girth, body length, wing length, shank length and thigh length. All the morphometric traits measured in chick were significantly ($P<0.05$) correlated with body weight. The breast girth has better correlation with body weight than other morphometric trait in Nera Black (0.763) and for the two strains combined (0.788). However, body length had the highest correlation with body weight in Lohmann Brown Classic chicks. Breast girth showed the highest coefficient of determination (R^2 value) of 0582 in Nera Black while body length had the highest R value of 0.715 and 0.610 for Lohmann Brown Classic and the two strains combined respectively. This study showed that morphometric trait like body length and breast girth can be used in estimation of body weight.
Keywords: Trait, prediction, correlation, regression, body weight

INTRODUCTION
Morphometric traits also called linear body measurements or conformation traits are important parameters in predicting body weight and this has been observed by commercial breeders and producers. Breeders, therefore, breed desirable sizes of chickens which also have the desirable production traits particularly body weight (Ojedapo *et al.*, 2010). Apart from body weight, a number of conformation traits are also known to be good indicators of good growth (Ibe, 1989). Such conformation traits include shank length, breast width, knee length, wing span, chicken height, body length, and head circumference (Ojo *et al.*, 2010). Linear body measurements have been used to predict live weights in poultry (Okon *et al.*, 1997), Prediction of body weight with morphometric traits in layers is therefore important.The easiest way to assess an animal's body mass is to weigh the animal. However, under some situations scale may not be available and prediction of body weight from body measurements could be preferred practically (Latshaw and Bishop, 2001). The objective of this study therefore to determine the morphometric parameters of egg strain chicks, their correlation between with body weight and develop a prediction equation for body weight from those parameters of egg strain chicks

MATERIAL AND METHODS
The experiment was conducted in the Department of Animal Science Teaching and Research Farm, Federal University Dutsin-ma. It lies within latitude 11° 7' and 13° 22' N and longitude 6° 52' and 9° 2' E (Abaje *et al.*, 2014).
A total of 200 day-old- layer chicks purchased from a reputable hatchery in Nigeria were used in the experiment.Routine management practices were carried out on the layer chicks. The chicks were fed *ad-libitum*. The data of prediction of body weight in egg layer strain chicks using morphometric traits were collected.Birds in each replicate were weighed at the beginning of the experiment and subsequently on weekly basis. Feed intakes were recorded weekly and were determined by the weigh-back technique. Feed conversion ratio was determined. The Linear Body Measurements were taken at week 10. The body parameters were taken in centimetres with the use of tape. Morphometric parameters measured include:thigh weight, shank length, breast girth, wing length and body length. SPSS (2008) Package was used to obtain estimate of correlation and regression between body weight and each of the morphometric trait. The significance of the correlation regression coefficient was determined at P-value of less than 0.05

RESULT AND DISCUSSION

Table 1 shows the comparison of means of body weight and linear body measurements of Nera Black and Lohmann Brown Classic layer strain chicks. Body weight, breast girth, wing length and thigh length were not significantly different between the strains. However, body length was significantly different with Nera Black having longer body length (23.55cm) than Lohmann Brown Classic (22.71cm).

Table 1: Comparison of means of body weight (g) and morphometric traits (cm) of Nera Black and Lohmann brown classic layer strain chicks at 10 week of age.

Trait	Near black	Lohmann brown classic	SEM
Body weight	552.24	531.68	13.55
Body length	23.55[a]	22.71[b]	0.22
Breast girth	19.87	19.73	0.27
Wing length	15.56	15.33	0.13
Shank length	6.88	6.57	0.11
Thigh length	7.25	6.99`	0.11

[a, b] Values with different superscripts differ significantly, SEM= Standard error of mean

Table 2 shows the correlation of the body weight and Morphometric traits of combined layer strain at week 10. Body weight is highly correlated to all the morphometric traits with Breast girth having the highest correlation (0.788).

Table 2: Combined correlation of body weight and morphometric traits of Nera Black and Lohmann Brown classic layer strains chicks at 10 week of age

	BW	BL	BG	WL	SL	TL
BW	1.000					
BL	0.781	1.000				
BG	0.788	0.545	1.000			
WL	0.732	0.795	0.582	1.000		
SL	0.592	0.797	0.298	0.729	1.000	
TL	0.656	0.769	0.369	0.714	0.896	1.000

BWT-body weight; BG-Breast girth; BL-Body length; WL-Wing length; SL-Shank length; TL-Thigh Length; SEM= Standard error of mean

Table 3 shows prediction equations relating the body weight and morphometric traits in combined layer strain at week 10. The R^2 values of range from 0.351 to 0.610 with Body length have the highest R^2 value of 0.610. This implies that body length could be the best predictor of body weight of layer strains.

Table 3: Combined regression of body weight of morphometric traits of Nera Black and Lohmann brown classic layer strains chicks at 10 week of age

Combined of two strain	Regression equation	R^2	SEM	LOS
Nera Black & Lohmann Brown	BWT= -55.794+47.239 BL	0.610	3.190	***
	BWT= -240.086+39.494 BG	0.606	2.693	***
	BWT= -604.590+74.230 WL	0.537	5.831	***
	BWT= 65.667+70.836 SL	0.351	8.145	NS
	BWT= -52.822+83.540 TL	0.430	8.130	NS

BWT-body weight; BG-Breast girth; BL-Body length; WL-Wing length; SL-Shank length; TL-Length; NS-Non significant; R^2- Regression square; SE-Standard error; LOS-Level of significance; ***Significant at p<0.001; **Significant at P<0.05

DISCUSSION

The high correlation between body weight and morphometric measurements in this study agrees with the earlier report of Yahaya *et al.* (2012) who obtained high correlation coefficients between body weight and morphometric traits in Hubbard and Arbor Acre broiler strains. The estimates contained in their reports were generally higher than the values obtained in the present study. The observed close relationship between body weight and breast girth in both Nera black and Lohmam brown classic agrees with the earlier findings of Adebambo *et al*. (2006) who reported that breast girth is a good indicator of predicting body weight in most poultry species.

The regression result shows that breast girth and body length could be the best predictors of the body weight of layer strain chicks. This result agreed with Udeh and Ogbu (2011) who reported that Arbor Acre strain with R^2 of 96% in breast girth and 92% in body length were the best predictors of the body weight of broiler strains. All other linear body parameters in all studied reported R^2 values above 50% which implies any of linear body parameter could also be used to predict body weight of the layer strain chicks. The result of regression coefficients of the two strains combined agrees with the observation Ubani *et al* (2011) who reported that breast girth and body length recorded the highest R^2 value among Nu-breed, Arbor, Acre and Marshall Strains between 3-5 weeks of age. The body length and breast girth are best for predicting body weight in layer chicks (Nera Black and Lohmann Brown Classic).

The result obtained from this research shows that prediction of body weight is possible from various linear body parameters. Generally breast girth and body length were found to be the best and most reliable parameter in estimates body weight. In terms of hierarchy, breast girth was significantly highest followed by body length in Nera Black and Lohmann Brown Classic at week 10. Application of linear model to all parameters at week 10 was found to be highly significant (P<0.05). All linear body parameter whose R^2 values were above 50% could be used to predict body weight of the layer strain, although the accuracy of prediction increased with an increase in the R^2 value.

CONCLUSION AND RECOMMENDATION

The present study showed that there exists strong correlation between body weight and most of the morphometric indices like body length, breast girth, wing length, shank length and thigh length of Nera Black and Lohmann brown Classic. Prediction of body weight is possible from various linear body parameters. Generally breast girth and body length were found to be the best and most reliable parameter in estimates body weight. It is therefore recommended that body length and breast girth be used in predicting body weight.

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